IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. 09/480,076
Filing Date ..... January 10, 2000
Inventor ..... Rickie C. Lake
Assignee ..... Micron Technology, Inc.
Group Art Unit 1733
Examiner ..... J. Haran
Attorney's Docket No. MI40-274
Title: Method of Conductively Interconnecting Electronic Components, Battery Powerable Apparatus, Radio Frequency Communication Device, and Electric Circuit

DECLARATION OF RICKIE C. LAKE UNDER 37 C.F.R. §1.132

I, Rickie C. Lake, hereby swear and state:

1.) I am the inventor of the subject matter of the above-referenced application.

2.) I received a Bachelor of Science Degree in Mechanical Engineering Technology from California State Polytechnic University, Pomona, California, in December 1983.

3.) I was recently rehired by Micron Technology in the state of Idaho in October 2003. I was previously employed by Intel Corporation in the state of California from September 1999 to October 2003. I was employed prior to that at Micron Technology in the state of Idaho from March 1992 through July 1999. I was employed by General Dynamics Corporation in the state of California from June 1983 through March 1992.

4.) Currently, I am engaged in the research and development of semiconductor wafer level packaging materials and processes. From September 1999 until October 2003, I was involved in the research and development of assembly processes and materials for fiberoptics and related high-speed telecommunication and optoelectronic packaging. From March of 1992 through July 1999, I was involved in the research and development of assembly processes and materials for various thin profile lithium anode batteries and radio frequency identification (RFID) devices.

5.) That at the time of the above referenced invention, one mechanism by which batteries, for example, thin-profile batteries or button-type batteries, are electrically connected with other circuits or components is with adhesives, for example, electrically conductive adhesives such as epoxy. Yet in some applications, a suitable conductive bond or interconnection is not created in spite of the highly conductive nature of the conductive epoxy, the outer battery surface, and the substrate surface to which the battery is being connected. The background problem to which this invention is directed relates to unfortunate high contact resistance occurring between the juncture of a battery and the conductive epoxy. Although the epoxy is inherently conductive, for reasons which were previously unknown, a very high contact resistance occurred in the connection between the conductive epoxy and the battery. It was initially thought that this high resistance contact was a result of oxide forming on the battery surface. An initial attempt to minimize this problem and increase conductance was to brush or buff the battery immediately prior to bonding the conductive epoxy and the

battery. This did have a positive effect in improving conductance, although not to the degree desired. Accordingly, this invention arose out of concerns associated with providing improved conductive adhesive interconnections to batteries.

6.) That upon consideration, I perceived that the relatively poor conduction of the prior art conductive bonding of a battery resulted from poor wetting characteristics of the conductive epoxy with the metal outer surface of the battery, which typically comprises a nickel-clad stainless steel. A surface comprising nickel has poor wetting characteristics with most liquid materials.

7.) That at the time of the above-referenced invention, silane additives for epoxy were not known to have been utilized within conductive epoxies for electrical bonding of the conductive epoxies with nickel surfaces nor for batteries. That I added an epoxy-terminated silane to conductive adhesives to be bonded with batteries, and the epoxy-terminated silane significantly improved the wetting characteristics of the conductive adhesives relative to metal surfaces to be bonded, such as nickel-clad stainless steel of a battery, in a manner which was not understood to have been reported or known in the prior art at the time of the above-referenced invention.

8.) I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and, further, that these statements were made with

knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 1-14-04

RICKIE C. LAKE